Toshiba Tmc7 softstarter user manual

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Caution Statements

This symbol is used throughout this manual to draw attention to topics of special importance to the installation and operation of the TMC7 soft starters.

Caution Statements cannot cover every potential cause of equipment damage but can highlight common causes of damage. It is therefore the installer's responsibility to adhere to all instructions in this manual, to follow good electrical practice and to seek advice before operating this equipment in a manner other than as detailed in this manual.

- Ensure that the TMC7 is completely isolated from the power supply before attempting any work on the unit.
- Do not apply incorrect voltages to the control input terminals.
- Ensure cables to the control inputs are segregated from AC power and control wiring.
- Some electronic contactor coils are not suitable for direct switching with PCB mount relays. Consult the contactor manufacturer/supplier to see if this is advisable.
- Do not connect Power Factor Correction capacitors to the output of TMC7 soft starters. If static power factor correction is employed, it must be connected to the supply side of the soft starter.

The examples and diagrams in this manual are included solely for illustrative purposes. Users are cautioned that the information contained in this manual is subject to change at any time and without prior notice. In no event will responsibility or liability be accepted for direct or indirect or consequential damages resulting from the use or application of this equipment.

WARNING - ELECTRICAL SHOCK HAZARD
TMC7 soft starter contains dangerous voltages when connected to line voltage. Only a competent electrician should carry out the electrical installation. Improper installation of the motor or the TMC7 may cause equipment failure, serious injury or death. Follow this manual, National Electrical Codes (NEC®) and local safety codes.

GROUNDING AND BRANCH CIRCUIT PROTECTION
It is the responsibility of the user or person installing the TMC7 to provide proper grounding and branch circuit protection according to the National Electric Codes (NEC®) and local codes.

SHORT CIRCUIT
The TMC7 soft starter is not short circuit proof. Therefore, after severe overload or short circuit, the operation of the starter should be fully tested.

Series Overview

2.1 Overview

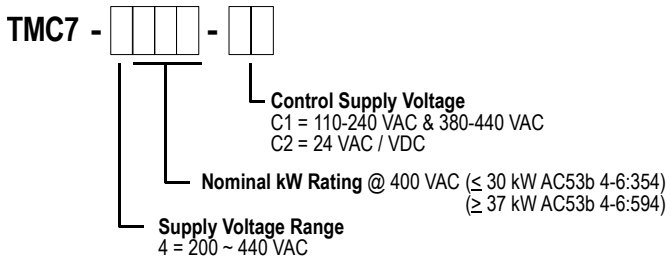
The TMC7 soft starter includes an internal bypass function that bypasses the soft starter SCRs during run. This allows the TMC7 to be installed in a non-ventilated enclosure without the need for an external bypass contactor.

2.2 Feature List

Feature	TMC7
Starting	
Current Limit	■
Current Ramp	■
Stopping	
Coast To Stop	■
Soft Stop	■
Protection	
Motor Overload	■
Phase Loss	■
Excess Start Time	■
Phase Rotation	■
Current Imbalance	■
Motor Thermistor	■
Power Circuit Fault	■
Supply Frequency	■
Communications Failure	■
Interface	
Fixed Relay Output (Main Contactor Relay)	■
Programmable Relay (Trip or Run)	■
Accessories	
Remote Operator	☐
MODBUS Module	☐
Profibus Module	☐
DeviceNet Module	☐
AS-i Module	☐
PC Set-up Software	☐

■ Standard ☐ Optional

2.3 Part Number Format

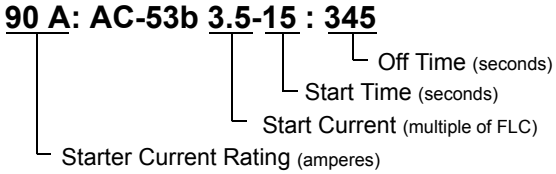


Specifications

3.1 Current Ratings

	AC53b 4-6:354 <1000 metres		AC53b 4-20:340 <1000 metres	
	40°C	**50°C**	**40°C**	**50°C**
TMC7-007	18 A	17 A	17 A	15 A
TMC7-015	34 A	32 A	30 A	28 A
TMC7-018	42 A	40 A	36 A	33 A
TMC7-022	48 A	44 A	40 A	36 A
TMC7-030	60 A	55 A	49 A	45 A
	AC53b 4-6:354 <1000 metres		**AC53b 4-20:340 <1000 metres**	
TMC7-037	75 A	68 A	65 A	59 A
TMC7-045	85 A	78 A	73 A	67 A
TMC7-055	100 A	100 A	96 A	87 A
TMC7-075	140 A	133 A	120 A	110 A
TMC7-090	170 A	157 A	142 A	130 A
TMC7-110	200 A	186 A	165 A	152 A

AC53b Utilisation Category Format



Starter Current Rating: The Full Load Current rating of the soft starter given the parameters detailed in the remaining sections of the utilisation code.

Start Current: The maximum available start current given the parameters detailed in the remaining sections of the utilisation code.

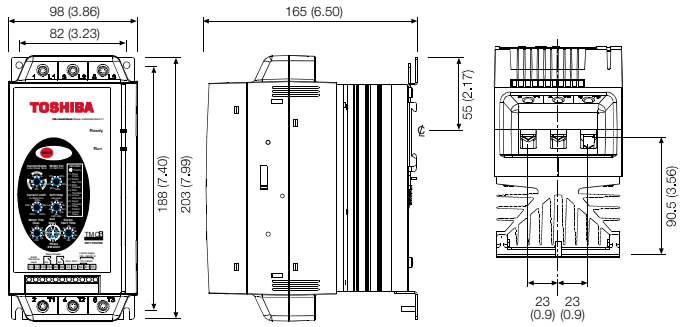
Start Time: The maximum available start time given the parameters detailed in the remaining sections of the utilisation code.

Off Time: The minimum allowable time between the end of one start and the beginning of the next start given the parameters detailed in the remaining sections of the utilisation code.

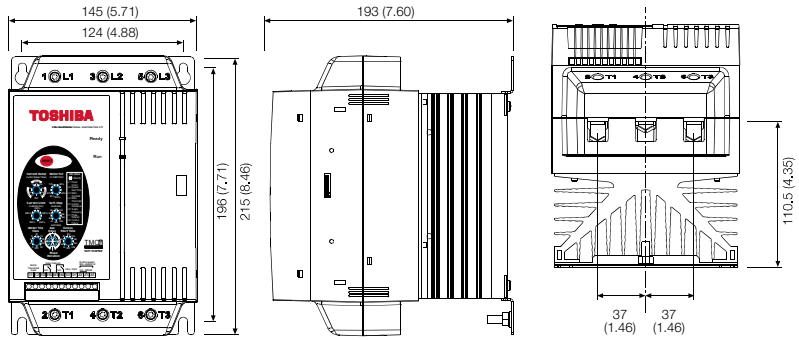
Contact your local supplier for ratings under operating conditions not covered by the above ratings charts.

3.2 Dimensions & Weights

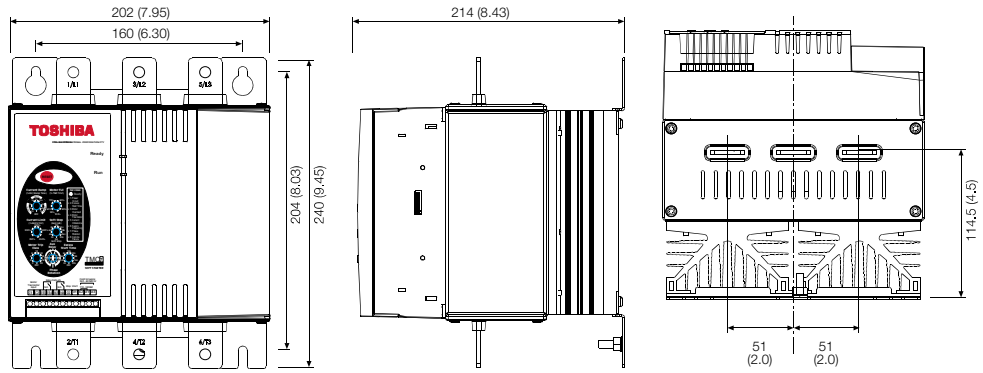
TMC7-007 ~ TMC7-030 (2.4kg)



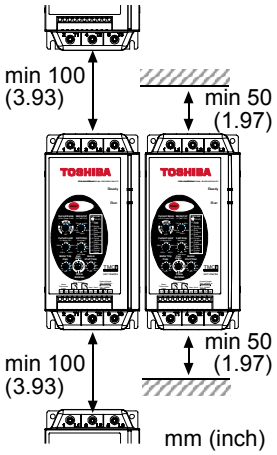
TMC7-037 ~ TMC7-055 (4.3kg)

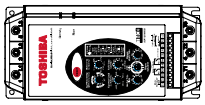


TMC7-075 ~ TMC7-110 (6.8kg)



3.3 Mounting





Derate TMC7 FLC by 15% (TMC7 FLC * 0.85)

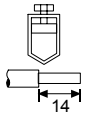
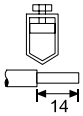
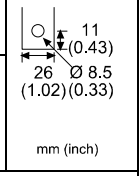
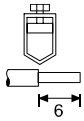
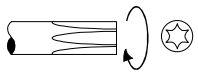
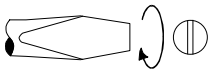
3.4 Semiconductor Fuses

Semiconductor fuses can be used with the TMC7 soft starter to reduce the potential for damage to SCRs from transient overload currents and for Type 2 coordination. TMC7 soft starters have been tested to achieve Type 2 coordination with semiconductor fuses. Suitable Bussman & Ferraz semiconductor fuses are detailed below.

TMC7 Model	SCR I^2t (A^2s)	Ferraz Fuse European/IEC Style (North American Style)	Bussman Fuse Square Body (170 M)	Bussman Fuse British Style (BS88)
007	1150	6.6URD30xxxA0063 (A070URD30xxx0063)	170M-1314	63 FE
015	8000	6.6URD30xxxA0125 (A070URD30xxx0125)	170M-1317	160 FEE
018	10500	6.6URD30xxxA0160 (A070URD30xxx0160)	170M-1318	160 FEE
022	15000	6.6URD30xxxA0160 (A070URD30xxx0160)	170M-1318	180 FM
030	18000	6.6URD30xxxA0160 (A070URD30xxx0160)	170M-1319	180 FM
037	51200	6.6URD30xxxA0250 (A070URD30xxx0250)	170M-1321	250 FM
045	80000	6.6URD30xxxA0315 (A070URD30xxx0315)	170M-1321	250 FM
055	97000	6.6URD30xxxA0315 (A070URD30xxx0315)	170M-1321	250 FM
075	168000	6.6URD31xxxA0450 (A070URD31xxx0450)	170M-1322	500 FMM
090	245000	6.6URD31xxxA0450 (A070URD31xxx0450)	170M-3022	500 FMM
110	320000	6.6URD31xxxA0450 (A070URD31xxx0450)	170M-3022	500 FMM

xxx = Blade Type. Refer Ferraz for options.

3.5 Power Terminations

	L1/1, L2/3, L3/5, T1/2, T2/4, T3/6 mm² (AWG)						A1, A2, A3, 01, 02, C1, C2, R43, R44, R33, R34 mm² (AWG)	
	007 ~ 030		037 ~ 055		075 ~ 110		007 ~ 110	
	10 – 35 (8 – 2)		25 – 50 (4 – 1/0)		n.a.		0.14 – 1.5 (26 – 16)	
	10 – 35 (8 – 2)		25 – 50 (4 – 1/0)		n.a.		0.14 – 1.5 (26 – 16)	
	Torx (T20) 3 – 5 Nm 2.2 – 3.7 ft-lb		Torx (T20) 4 – 6 Nm 2.9 – 4.4 ft-lb		n.a.		n.a.	
	7 mm 3 – 5 Nm 2.2 – 3.7 ft-lb		7 mm 4 – 6 Nm 2.9 – 4.4 ft-lb		n.a.		3.5 mm 0.5 Nm max. 4.4 lb-in max.	

75 °C Wire. Use copper conductors only.

3.6 General Technical Data

Mains supply (L1, L2, L3)	
TMC7-xxxx-xx	3 x 200 VAC ~ 440 VAC (+10% / - 15%)
Supply frequency (at start)	45 Hz to 66 Hz
Rated insulation voltage	600 VAC
Rated impulse withstand voltage	4 kV (1, 2/ 50µs at 2000 m)
Form designation	Bypassed semiconductor motor starter form 1

Control supply (A1, A2, A3)	
TMC7-xxxx-C1	110-240 VAC (+10% / - 15%) or 380-440 VAC (+10% / - 15%)
TMC7-xxxx-C2	24 VAC/VDC (±20%)

Control Inputs	
Start Terminal 01	Normally Open, 300 VAC max.
Stop Terminal 02	Normally Closed, 300 VAC max.

Relay Outputs	
Main Contactor (Terminals R43 & R44)	Normally Open
	6 A, 30 VDC resistive / 2 A, 400 VAC, AC11
Programmable Relay (Terminals R33 & R34)	Normally Open
	6 A, 30 VDC resistive / 2 A, 400 VAC, AC11

Environmental	
Degree of protection TMC7-007 to TMC7-055	IP20
Degree of protection TMC7-075 to TMC7-110	IP00
Operating Temperatures	-10 °C to + 60 °C
Humidity	5% to 95% Relative Humidity
Pollution Degree	Pollution Degree 3
Vibration	IEC 60068 Test Fc Sinusoidal
	4 Hz to 13.2 Hz: ± 1 mm displacement
	13.2 Hz to 200 Hz: ± 0.7 g

EMC Emission	
Equipment class (EMC)	Class A
Conducted radio frequency emission	0.15 MHz to 0.5 MHz : <90 dB (µV)
	0.5 MHz to 5 MHz : <76 dB (µV)
	5 MHz to 30 MHz : 80-60 dB (µV)
Radiated radio frequency emission	30 MHz to 230 MHz : <30 dB (µV/m)
	230 MHz to 1000 MHz : <37 dB (µV/m)
This product has been designed for Class A equipment. Use of the product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.	

EMC Immunity	
Electrostatic discharge	4 kV contact discharge, 8 kV air discharge
Radio frequency electromagnetic field	0.15 MHz to 1000 MHz: 140 dB (µV)
Fast transients 5/50 ns (Main & control circuits)	2 kV / 5.0 kHz
Surges 1.2/50 µs – 8/20 ms (Main & control circuits)	2 kV line to earth, 1 kV line to line
Voltage dip and short time interruption	5000 ms (at 0% nominal voltage)

Short Circuit	
Rated short-circuit current TMC7-007 to TMC7-037	5 kA
Rated short-circuit current TMC7-045 to TMC7-110	10 kA

Heat Dissipation	
During Start	3 watts / Ampere
During Run	< 4 watts

Standards Approvals	
C✓	IEC 60947-4-2
CE	IEC 60947-4-2

3.7 Frequently Asked Questions (and their answers):

- *What is the minimum allowable motor current when using a TMC7 closed loop soft starter?*
  The minimum "Motor FLC" setting is 50% of the TMC7 nameplate rating. All the motor protections are based on this setting.

  It is possible to operate a TMC7 with a small kW motor, for testing purposes. In this case, the motor will effectively start DOL, and the TMC7 will not protect the motor. The starter will not trip, because there is no under-current protection on TMC7.

- *What type of motor protection does the TMC7 have?*
  The TMC7 has built-in motor overload protection of the electronic "thermal model" type. The motor current is continuously monitored and the expected temperature is calculated based on this monitored current.

  The rate of rise of the calculated motor temperature is determined by the Motor Trip Class setting. The lower this setting, the faster the rate of rise of calculated motor temperature. A Motor Overload trip (x 2 Ready LED flashes) will occur when the calculated temperature reaches 105%. The setting of the Motor Trip Class pot is similar to a motor trip class setting on a standard thermal overload relay.

  An external motor protection device is not required when using a TMC7 soft starter. TMC7 is certified to conform to the IEC60947-4-2 standard for electronic soft starters. The reliability of the motor protection feature is part of this standard.

- *How do I select a TMC7 soft starter for duty cycles different from those listed in the standard ratings table?*
  The WinStart software package is available for selecting soft starters for different duty cycles.

- *What are the TMC7 operational ratings before maintenance may be required?*
  The operational ratings for TMC7 are size-dependent, and are due to the capability of the internal bypass relays:
  Size 1 & 2 (7.5 ~ 55 kW): 1,000,000 operations
  Size 3 (75 ~ 110 kW): 100,000 operations.

- *When would I use a line contactor?*
  A line contactor may be compulsory for a specific installation.
  This requirement will be the same whether using a 2-phase controlled soft starter or a 3-phase controlled soft starter (refer Product Note for more detail).

- *How do I size the fuses of the motor branch circuit when using a TMC7 soft starter?*
  For "Current Limit" settings < 350% and start times < 15 seconds, the nominal rating of standard line supply fuses should be 1.75 x Motor FLC. If motor rated fuses are being used, their nominal rating should be 1.5 x Motor FLC.

  For "Current Limit" settings > 350% and start times > 15 seconds, the nominal rating of standard line supply fuses should be 2 x Motor FLC. If motor rated fuses are being used, their nominal rating should be 1.75 x Motor FLC.

- *When would I use semiconductor fuses?*
  Either when specified for an installation, or when Type 2 coordination is required.

  The TMC7 is internally bypassed, so the SCRs are in use only during starting and soft stopping.

- *What is the current consumption of the TMC7 control supply?*
  The steady state consumption the control supply is 100 mA maximum, for both C1 & C2 models.

  However, the short time inrush current at control supply "switch-on" can be as high as 10 A for C1 models, and 2 A for C2 models (due to the SMPS power supply).

- *How can the TMC7 programmable output relay be used?*
  The programmable output relay provides an N/O contact, which can be used for a "Trip" or "Run" output.

  Trip output:
  The relay operates when the TMC7 trips on any fault. This can be used to operate a shunt-trip mechanism of an upstream circuit breaker to isolate the motor branch circuit. It could also be used to signal TMC7 "Trip" status to an automation system.

  Run output:
  The relay operates on completion of start ramp. This can be used to operate a contactor for power-factor correction capacitors. It could also be used to signal TMC7 "Run" status to an automation system.

- *Is the TMC7 suitable for flying start application?*
  Yes. There is a built-in 2 second delay between the end of one stop and the beginning of the next start. This delay allows the motor flux to decay, eliminating any chance of the TMC7 tripping on Power Circuit fault (x 1 Ready LED flash) due to detection of motor back EMF when the start signal is applied. The major effect of a flying start is on the actual time the TMC7 "current limits". The ramp-up time will be reduced and is determined by the motor speed on re-application of the start signal.

- *What is the remote start and stop input impedance? Are any special precautions necessary during installation?*
  The 01/02 input impedance is approximately 400 kΩ @ 300 VAC and 5.6 kΩ @ 24 VAC/VDC.

  All control wiring, for long runs, should be either twisted pair or shielded cable with the screen earthed at one end. Control wiring should be separated from power cables by a minimum distance of 300 mm.

  If long cable runs cannot be avoided, the best assurance against noise interference is to install an interposing relay in close proximity to the TMC7 soft starter.

- *Why is it necessary to apply control voltage before (or with) mains voltage?*
  There is a possibility the soft starter could arrive at site with the internal bypass relays in "closed" state. On first application of control voltage, the bypass relays are commanded to open. If mains voltage is applied without control voltage, this step is missed, and the motor may start DOL without warning (refer Product Note for more detail).

- *Why is the middle phase starting current higher than the other two phases?*
  The middle phase (L2/T2) of the TMC7 is uncontrolled. During soft starting, SCRs in the two outside phases (L1/T1 & L3/T3) provide control. The current in the uncontrolled phase will always be higher than the current in the two controlled phases, typically by 20-25%.
  Note: the current in the uncontrolled phase will still be lower than the locked rotor current of the motor (refer Product Note for more detail).

- *What are the under- & over-frequency trip points for TMC7 soft starters?*
  The trip points are 40 & 72 Hz. If the frequency falls below 40 Hz or rises above 72 Hz, the soft starter will trip (x 6 Ready LED flashes). These trip points are not adjustable.

  A supply frequency trip will also occur if all 3 phases from the mains supply are lost, or fall below approximately 120 VAC while the soft starter is running.

  A supply frequency trip will occur if the line contactor drops out during running.

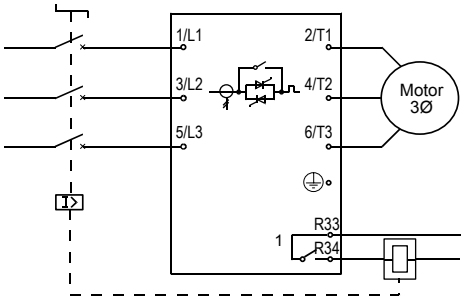
TMC7 Series

4.1 Overview

TMC7 soft starters provide current limit soft start, soft stop and a range of motor protection functions.

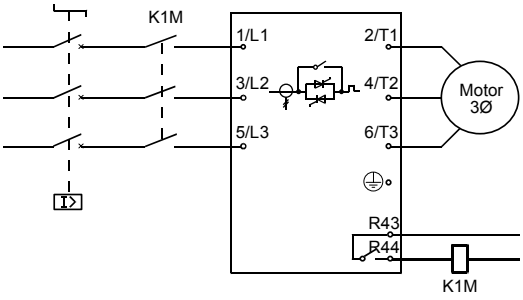
4.2 Electrical Schematics

Example 1. TMC7 soft starter installed with a system protection circuit breaker complete with a shunt trip device.



[1] Auxiliary Relay Function = Trip

Example 2. TMC7 soft starter installed with a system protection circuit breaker and line contactor.

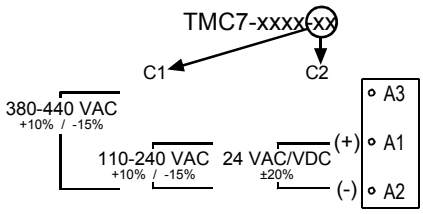


4.3 Control Voltages

TMC7 Series can be supplied in either of two control voltage configurations.

TMC7-xxxx-C1..... 110-240 VAC (+10% / - 15%)
or 380-440 VAC (+10% / - 15%)

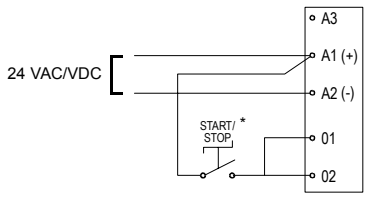
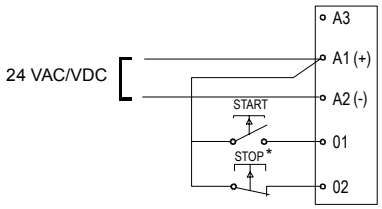
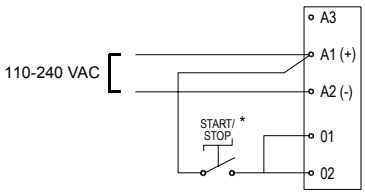
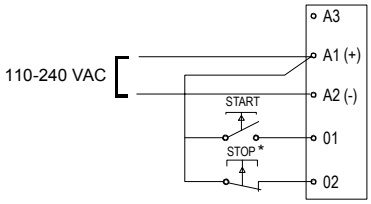
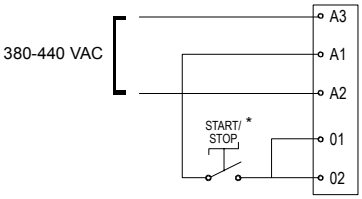
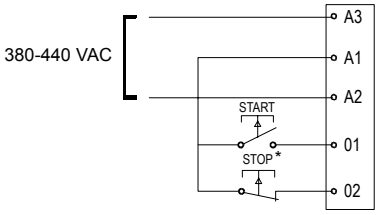
TMC7-xxxx-C2 ..... 24 VAC/VDC (±20%)



WARNING:
Always apply control voltage before (or with) mains voltage.

CAUTION:
With 24 VAC/VDC use contacts rated for low voltage and low current (gold flash or similar).

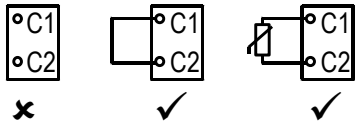
4.4 Control Circuits

Control Voltage	2 Wire Control	3 Wire Control
24 VAC/VDC (C2 models)		
110-240 VAC (C1 models)		
380-440 VAC (C1 models)		

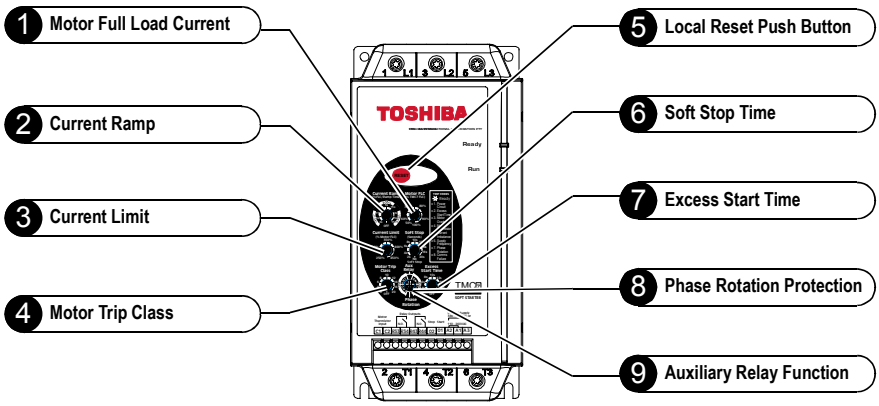
* Also resets trip states.

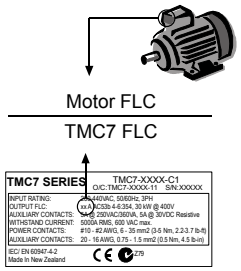
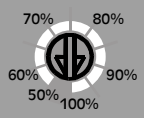
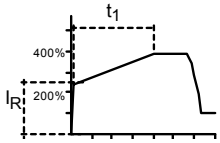
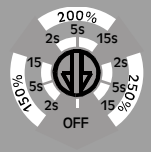
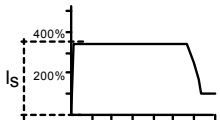
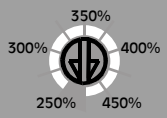
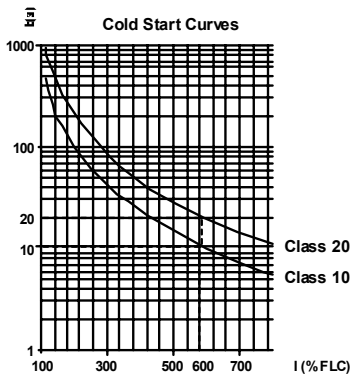
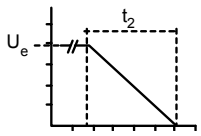
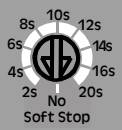
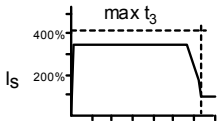
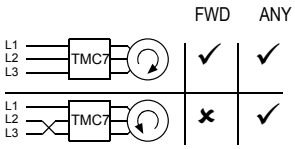
4.5 Motor Thermistor

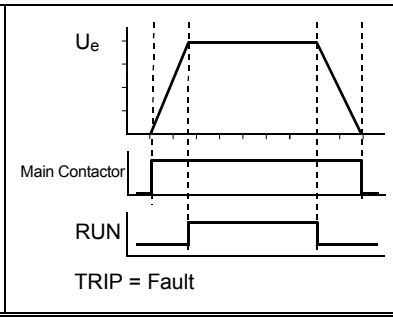
Motor thermistors (if any) can be connected directly to the TMC7 terminals C1 & C2. If no motor thermistors are connected there must be a link between C1 & C2.



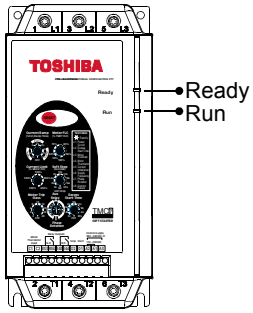
4.6 Adjustments



Number	Parameter		Adjustment
1	Motor Full Load Current		
2	Current Ramp		
3	Current Limit		
4	Motor Trip Class		 OFF = no overload protection
5	Local Reset Push Button		RESET
6	Soft Stop Time		
7	Excess Start Time		
8	Phase Rotation Protection		

9	Auxiliary Relay Function		

4.7 Indication



LED Status	Ready	Run
Off	No control power	Motor not running
On	Ready	Motor running at full speed
Flash	Starter tripped	Motor starting or stopping

4.8 Diagnostic Trip Codes

Ready LED	Description
x 1	Power Circuit: Check mains supply L1, L2 & L3, motor circuit T1, T2 & T3 and soft starter SCRs.
x 2	Excess Start Time: Check load, increase Current Limit or adjust Excess Start Time setting.
x 3	Motor Overload: Allow motor to cool, reset soft starter and restart. Soft starter cannot be reset until motor has cooled adequately.
x 4	Motor Thermistor: Check motor ventilation and thermistor connection C1 & C2. Allow motor to cool.
x 5	Current Imbalance: Check line current L1, L2 & L3.
x 6	Supply Frequency: Check supply frequency is in range.
x 7	Phase Rotation: Check for correct phase rotation.
x 8	Network Comms Failure (between accessory module and network): Check network connections and settings.
x 9	Starter Comms Failure (between starter and accessory module): Remove and refit accessory module.

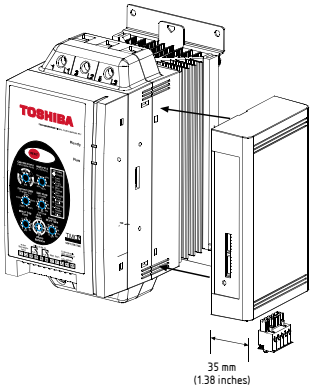
Accessories

5.1 Overview

The TMC7 Series includes a range of optional accessories including:

- TMC7 Series Remote Operator
- MODBUS RTU Module
- Profibus Module
- DeviceNet Module
- AS-i Module
- PC Set-up Software

The accessory items interface with the TMC7 soft starters by way of plug-in module.



Control power and mains supply must be removed from the TMC7 soft starters before attachment or removal of accessory items. Failure to do so may result in equipment damage.

5.2 Remote Operator

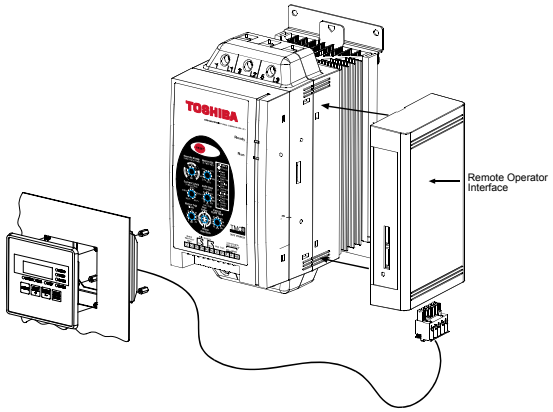
Part Number: TMC7-ROM-01

The TMC7 Remote Operator can control and monitor TMC7 soft starter performance. Functionality includes:

- Push Button Control (Start, Stop, Quick Stop & Reset)
- TMC7 Status LEDs (Start, Run & Trip)
- Communication Status LED
- Motor Data Display (motor current & temperature)
- TMC7 Trip Code Display
- 4-20 mA Output (motor current)

Installation

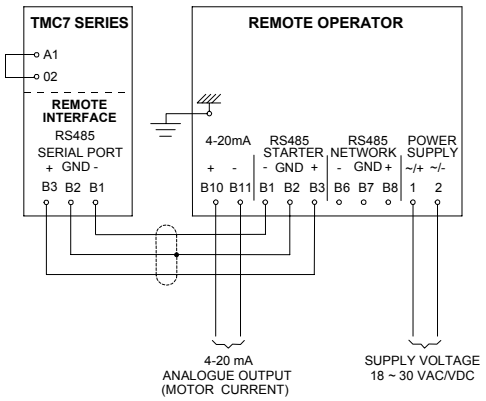
1. Connect the TMC7 Remote Operator Interface to the TMC7 soft starter.



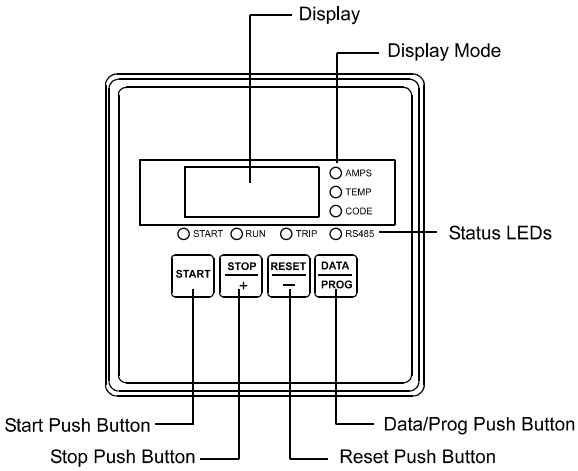
Control power and mains supply must be removed from the TMC7 soft starters before attachment or removal of accessory items. Failure to do so may result in equipment damage.

2. Cut a 92mm^2 hole in the panel and fit the TMC7 Remote Operator.

3. Wire between the Remote Operator and TMC7.

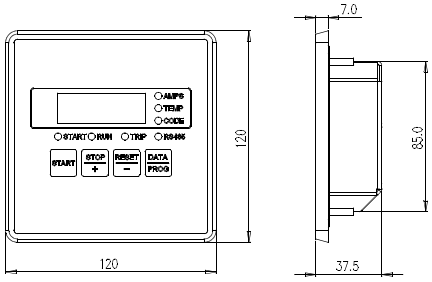


Operation



	Description
Start Push Button	Starts the motor.
Stop Push Button	Stops the motor.
Reset Push Button	Resets the TMC7.
Data/Prog Push Button	Select the data type to be shown on the display (Motor Current or Motor Temperature).
Display Mode	Indicates data type shown on the display: • Motor Current • Motor Temperature • Trip Code
Display	Indicates the value of the currently selected data.
Status LEDs	Indicates status of the TMC7 and the RS485 link between the Remote Operator and TMC7. **NOTE:** Simultaneously pressing the Stop and Reset pushbuttons initiates a quick stop, which immediately removes voltage from the motor, ignoring any soft stop time set on the TMC7 soft starter.

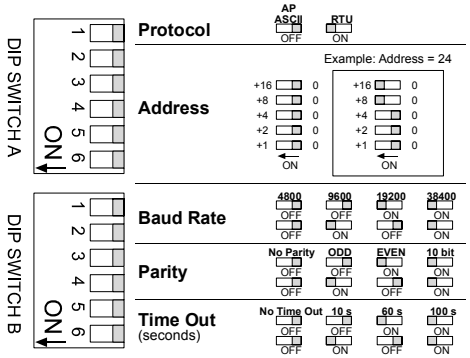
Dimensions



5.3 MODBUS Module Part Number: TMC7-MBM-01

The MODBUS Module can be used with the TMC7 to enable control and monitoring via a MODBUS RTU network.

Adjustment



Register

Address	Function	Type	Description	
40002	Command	Write	1=Start 2=Stop 3=Reset 4=Quick Stop 5=Forced Comms Trip	
40003	Starter Status	Read	Bit 0-3	Description 0=Not used 1=Ready 2=Starting 3=Running 4=Stopping 6=Tripped
			4	1=Forward Phase Rotation
			5	Unallocated
			6	Unallocated
			7	Unallocated
40004	Trip Code	Read	255=No Trip 1=Excess start time 2=Motor overload 3=Motor thermistor 4=Current imbalance 5=Supply frequency 6=Phase rotation 8=Power circuit 16=Comms failure	
40005	Current	Read		
40006	Temp	Read		

MODBUS Hex Functions

Two functions are supported: 03 (Multiple read)
06 (Single write)

The TMC7 does not accept broadcast functions.

NOTE:
Command, Starter Status, Trip Code, Current and Temperature must be sent individually.
ie one data word request at a time.

Examples

Command: Start

Message	Starter Address	Function Code	Register Address	Data	CRC
In	20	06	40002	1	CRC1, CRC2
Out	20	06	40002	1	CRC1, CRC2

Starter Status: TMC7 Running

Message	Starter Address	Function Code	Address / Bytes Read	Number / Value	CRC
In	20	03	40003	1	CRC1, CRC2
Out	20	03	2	xxxx0011	CRC1, CRC2

Trip Code: Motor overload

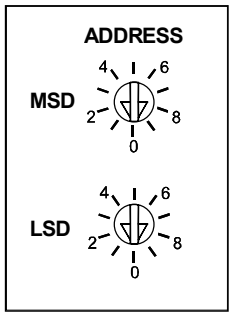
Message	Starter Address	Function Code	Address / Bytes Read	Number / Value	CRC
In	20	03	40004	1	CRC1, CRC2

5.4 Profibus Module

Part Number: TMC7-PBM-01

The Profibus Module can be used with the TMC7 to enable control and monitoring via a Profibus network.

Adjustment Address



Data rate

The interface has data rate auto-detection so no adjustment is required for this.

Low Voltage Switchgear (LVSG)
Motor Starter Format 1 Profile Basic Data Structure

Master > Slave Control Word is structured as follows.

BYTE 1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	*Reserved*	*Reserved*	*Reserved*	Reset	*Reserved*	*Reserved*	Fwd Run
BYTE 2							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	*Reserved*	*Reserved*	Quick Stop	*Reserved*	*Reserved*	*Reserved*	*Reserved*

Slave > Master Status Word is structured as follows.

BYTE 1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	*Reserved*	*Reserved*	*Reserved*	*Reserved*	Fault	On	Ready
BYTE 2							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Ramping	*Reserved*	Motor Current (% FLC) [1]					

[1] Only available from TMC7 units with serial number format xxxxx-4 or greater.

Low Voltage Switchgear (LVSG)
Motor Starter Format 1 Profile with Extended Data Structure

Master > Slave output byte is structured as follows:

BYTE 3
Operating Parameter request (Parameter Number 1-4)

Slave > Master input bytes, in response to an Operating Parameter request, are structured as follows:

BYTE 3	
Bits 7-1 *Reserved*	Bit 0 = 1 = Invalid Parameter Number
BYTE 4	
Echo Parameter Number	
BYTE 5	
High Byte Operating Parameter value read from the TMC7	
BYTE 6	
Low Byte Operating Parameter value read from the TMC7	

Parameter Numbers are defined as follows:

Parameter Number	Parameter Value High Byte	Parameter Value Low Byte
0	*Reserved*	*Reserved*
1	Soft Starter Product Type Code (= 4) Bits 7 to 3 only	TMC7 Software Version Number
2	Trip Number	TMC7 State
3	Average current (high byte)	Average current (low byte)
4	*Reserved*	Motor Temperature
5 to 15	*Reserved*	*Reserved*

TMC7 Parameter Number 2 Low Byte is structured so that Bits 0 – 3 indicate TMC7 status and Bits 4 – 7 function as follows:

Value (decimal) Bits 0 - 3	TMC7 Status	
0	Unknown	(Communication error between interface and TMC7)
1	Ready to start	(Waiting)
2	Starting	(TMC7 soft starting)
3	Running	(TMC7 running and bypass contactors closed)
4	Stopping	(TMC7 soft stopping)
5	Not Ready	(Restart delay)
6	Fault	(TMC7 has tripped)

Bit Number	Function
Bit 4	Set if positive phase rotation detected (Bit 6 must = 1)
Bit 5	Set if average current exceeds FLC setting
Bit 6	Set after first start once phase rotation has been confirmed
Bit 7	Set if a comms failure occurs between interface and TMC7

TMC7 Parameter Number 2 High Byte indicates the TMC7 trip number. Details are as follows:

Value (decimal)	TMC7 Trip State
1	Excess Start Time
2	Motor Overload
3	Motor Thermistor
4	Current Imbalance
5	Supply Frequency
6	Phase Rotation

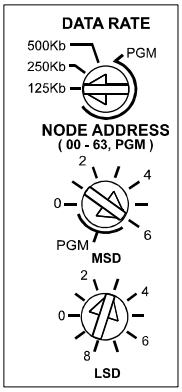
8	Power Circuit
15	Communication failure between interface and TMC7
16	Communication failure on Profibus network
255	No trip

5.5 DeviceNet Module

Part Number: TMC7-DNM-01

The DeviceNet Module can be used with the TMC7 to enable control and monitoring via a DeviceNet network.

Adjustment



Data transmitted from the Master is as follows:

BYTE	BIT	Function
0	0	0 = Stop command 1 = Start command
	1	0 = Enable Start or Stop command 1 = Quick Stop (ie, coast to stop) and disable Start command
	2	0 = Enable Start command 1 = Reset command and disable Start command
	3 to 7	*Reserved*
1	0 to 7	*Reserved*

Data received by the Master is as follows:

BYTE	BIT	Function	Value
0	0	Trip/fault	0 = no trip 1 = trip
	1	*Reserved*	
	2	Running 1	0 = unknown, ready to start or trip 1 = starting, running or stopping
	3	*Reserved*	
	4	Ready	0 = start or stop command not acceptable 1 = start or stop command acceptable
	5	Control from net	1 (always = 1)
	6	*Reserved*	
	7	At reference	1 = running (full voltage)
1	0 to 7	Status	0 = unknown 2 = not ready (restart delay) 3 = ready to start 4 = starting or running 5 = soft stopping 7 = trip/fault

2	0 to 7	Trip/fault code	0 = no trip 20 = motor overload 26 = current imbalance 50 = power circuit 54 = phase rotation 55 = supply frequency 75 = motor thermistor 101 = excess start time 113 = comms failure between interface and TMC7 114 = network comms failure
3	0	Initialised	1 = phase rotation bit is valid (bit 1) after 1st start
	1	Phase rotation	1 = positive phase rotation detected
	2 to 7	*Reserved*	
4	0 to 7	Current (low byte)	current (A)
5	0 to 7	Current (high byte)	
6 [1]	0 to 7	Current %FLC (low byte)	current as a percentage of soft starter FLC setting (%)
7 [1]	0 to 7	Current %FLC (high byte)	
8	0 to 7	Temperature	motor temperature (%)
9 to 13	0 to 7	*Reserved*	

[1] Only available from TMC7 units with serial number format xxxxx-4 or more.

5.6 AS-i Module

Part Number: TMC7-ASM-01

The AS-i Module can be used with the TMC7 to enable control and monitoring via an AS-i network.

(Under development).

5.7 PC Set-up Software

The PC Set-up Software can be used with both the TMC7 and TMS7 soft starters to provide the following functionality for networks of up to 99 soft starters.

Feature	TMC7	TMS7
Operational Control (start, stop, reset, quick stop)	■	■
Status monitoring (ready, starting, running, stopping, tripped)	■	■
Performance monitoring (motor current, motor temperature)	■	■
Upload parameter settings		■
Download parameter settings		■

System Requirements

- Pentium II 266 Mhz processor
- 64 MB RAM.
- 12 MB free space on hard disk.
- Microsoft Mouse or other compatible pointing device.
- EGA, VGA, or compatible display (VGA or higher is recommended).
- An RS485 communication port or RS232 to RS485 converter
- Microsoft Windows 95, 98, 2000, NT or XP.

Additionally, each TMC7 soft starter connected to the network must be fitted with a MODBUS Module (TMC7-MBM-01) or Remote Operator (TMC7-ROM-01).